

PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Improvements in or relating to Hydraulic Apparatus for Breaking Down Rocky and like materials

We, GULLICK LIMITED, a British Company of Kirkless Street, Wigan, Lancashire, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention is for improvements in or relating to hydraulic or other pressure-fluid operated (hereinafter referred to as hydraulic) apparatus for breaking down rocky and like material. The apparatus is particularly, although not exclusively, applicable to the breaking-down of coal, or the like in mining operations and the carrying out of demolition work.

The hydraulic burster is a well-known piece of apparatus for this purpose. A known form of hydraulic burster consists of a body part, generally cylindrical, having at spaced intervals along its length a plurality of small hydraulic rams which act in a radial or lateral direction with respect to the longitudinal axis of the burster. In using such a burster, a hole is first drilled into the material to be broken down. The burster is then inserted in the hole and hydraulic fluid under pressure is supplied to the rams so that they are forced outwardly and break down the material.

An arrangement as just described necessitates a relatively large drill hole, i.e. of the order of 2½" to 3½" diameter. The drilling of this hole is a laborious procedure and is, in fact, the longest part of the operation.

One object of the present invention is to provide a hydraulic burster which will only necessitate the drilling of a relatively small hole as compared with the size of hole previously required.

According to the present invention there

is provided a hydraulic apparatus for breaking down rocky and like materials comprising a burster member or mandrel adapted to be inserted in a drill hole or the like and comprising at least two parts mated together by a wedge or inclined plane arrangement, so that relative movement between said parts will expand said member or mandrel laterally or radially, and a hydraulic ram device for effecting said relative movement.

In a preferred arrangement the hydraulic ram device is arranged so that it acts in the direction of length of the burster member or mandrel.

In one preferred embodiment of the invention the burster member or mandrel when completely collapsed is of cylindrical or substantially cylindrical form the two parts of the burster member or mandrel having a plurality of inter-fitting pairs of wedge or inclined plane devices extending along the length of the burster member.

One particular embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings in which:—

Figure 1 is a sectional view showing the apparatus with the burster member or mandrel in its collapsed condition,

Figure 2 is a cross-section on the line II—II of Figure 1,

Figure 3 is a fragmentary sectional view showing the burster member or mandrel partially expanded by hydraulic loading, and

Figure 4 is a cross-section on the line IV—IV of Figure 3.

The apparatus shown on the drawing comprises a hydraulic ram having a cylinder 10 in which works the piston or ram proper 11. The piston 11 has a piston rod 12 which

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passes out of the cylinder 10 through a gland or fluid-type seal 13 to form one part 14 of the burster member or mandrel the other part of which is indicated at 15.

5 The cylinder 10 has an inlet 16 for hydraulic pressure-fluid and 17 is an outlet or venting port. The port arrangements may be modified so that the piston can be provided with pressure-fluid on both sides i.e. so that
10 the ram is double acting.

The burster member or mandrel 14, 15 is of substantially cylindrical form in cross-section when in the condition shown in Figure 1, and its two parts 14 and 15 are inter-
15 locked so that the part 14 can slide axially with respect to the part 15 and so that the part 15 can move radially or laterally outward and inward with respect to the part 14.

The parts 14 and 15 also have a series of inter-engaging wedge or inclined plane devices 18 and 19 respectively.

To carry out a bursting operation a hole H is first drilled in the material M to be broken down. The size of this hole is such that it will receive as a sliding fit the mandrel
25 14, 15 when the latter is in the collapsed condition shown in Figure 1.

After the mandrel or burster member 14, 15 has been inserted in the hole H, hydraulic fluid is pumped under pressure into the cylinder 10 through the port 16. This causes the
30 piston 11 to move to the right and the part 14 of the mandrel to move longitudinally relatively to the part 15, the latter part being restrained by the cylinder 10. This produces a force normal to the axis of the drill hole and forces the part 15 laterally outwardly with respect to the part 14 so as to burst the
35 hole H to break down the material M.

The ratio between the cylinder diameter and the inclination of the wedge faces of the wedge devices 18, 19 may be varied to suit the material to be broken down.

The mandrel or burster member may be
45 made up of more than two parts and the arrangement may be such that more than one part moves radially outwardly or laterally with respect to another or other parts.

Retaining means may be provided for interlocking or connecting the parts of the mandrel or burster member so that one part of the apparatus cannot be lost or mislaid with respect to another part. For instance the parts
50 could be chained together or have an inter-

fitting key and keyway arrangement with sufficient clearance to permit the expansion of the mandrel. 55

WHAT WE CLAIM IS:—

1. Hydraulic apparatus for breaking down rocky and like materials comprising a burster member or mandrel adapted to be inserted in a drill hole or the like and comprising at least two parts mated together by a wedge or inclined plane arrangement, so that relative movement between said parts will expand said burster member or mandrel laterally or radially, and a hydraulic ram device for effecting said relative movement. 60

2. Hydraulic apparatus as claimed in claim 1 wherein the ram device is arranged so that it acts in the direction of length of the burster member or mandrel. 65

3. Hydraulic apparatus as claimed in either of the preceding claims wherein the burster member or mandrel when completely collapsed is of cylindrical or substantially cylindrical form, the parts of the burster member or mandrel having a plurality of interfitting pairs of wedge or inclined plane devices extending along the length of the burster member or mandrel. 70

4. Hydraulic apparatus as claimed in any of the preceding claims wherein the ram of the ram device is retracted into its cylinder so as to expand the burster member or mandrel. 75

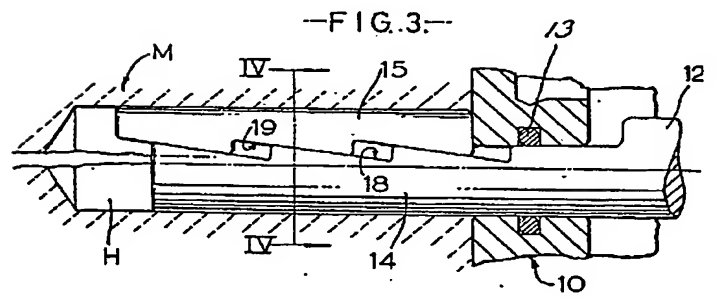
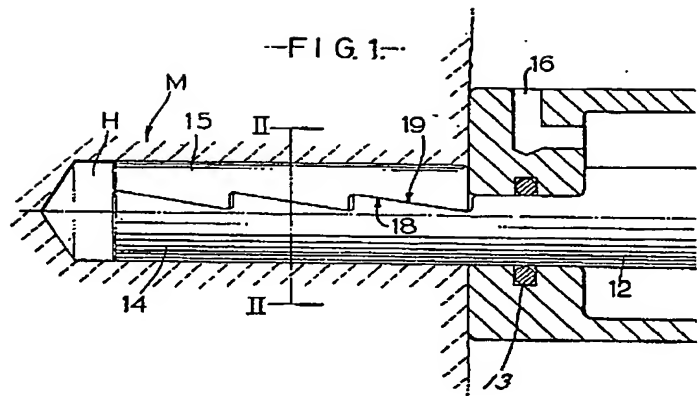
5. Hydraulic apparatus as claimed in any of the preceding claims wherein the ram device has a piston and cylinder in axial alignment with the burster member or mandrel. 80

6. Hydraulic apparatus as claimed in any of the preceding claims wherein retaining means is provided for interlocking or connecting the parts of the mandrel or burster member. 85

7. Hydraulic apparatus for breaking down rocky and like materials substantially as herein described.

8. Hydraulic apparatus for breaking down rocky and like materials substantially as herein described with reference to the accompanying drawings. 90

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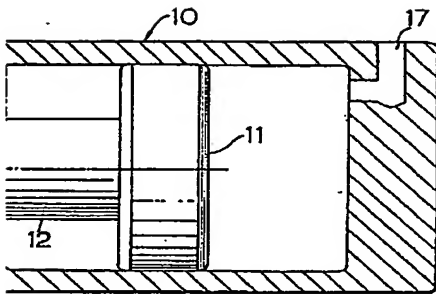


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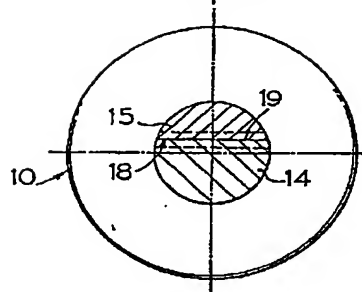
COMPLETE SPECIFICATION

1 SHEET

*This drawing is a reproduction of
the Original on a reduced scale*



—FIG. 2—



—FIG. 4—

